

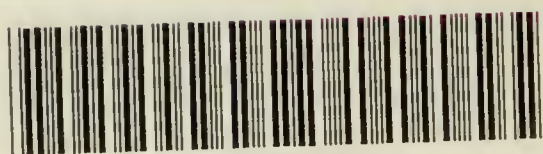




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# METRIC WEIGHTS AND MEASURES.

## SPEECH

OF

MR. BERESFORD HOPE, M.P.,

IN MOVING THE REJECTION OF THE

METRIC WEIGHTS AND MEASURES BILL,

WEDNESDAY, MAY 13, 1868.

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REVISED.

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L O N D O N :

EDWARD STANFORD, 6 AND 7, CHARING CROSS, S.W.

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1868.



ADJW.41(2)



## S P E E C H, & c.

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SIR,

In rising to move that this Bill be read a second time this day six months, I must congratulate my hon. friends who have preceded me upon the manner in which they have conducted the debate. From first to last there has been on their part an admirable assumption of the whole question. From first to last the House has not been favoured with any clear definition of what this metrical system is which we are now asked in this sudden manner to force upon the people of the land. “Metricalisation” —I should have hesitated to use the uncouth word, only I have found it in the Blue Book of 1862, of the Hon. Member for Dumfries, in which his case lies\*— is one thing, while decimalisation is a totally different thing; and yet nine-tenths of the arguments which they have used to induce the House to accept a change from the one system to the other are founded upon the assumption that they are one and the same thing. Decimalisation is a process of calculation for the benefit of the calculator. Metricalisation is not a process, but a system of measures, so called from its

\* Report from Select Committee on Weights and Measures, 15th July, 1862.

unit or base, which happens accidentally to be facilitated by the ease with which its details may be worked out through means of the decimal notation. The metrical system in itself is an abstruse and philosophic one, founded upon the fancy of some French men of science at the time of the Revolution, who adopted as the starting-point of the system the measurement of the earth's circumference, and by way of a unit, measured the 10,000,000th part of a quadrant of a meridian through Paris (about  $39\frac{5}{13}$  inches) which they termed a "metre." No doubt those multiples and aliquot parts of the metre which form the French measures of length are adjusted to meet the decimal system, as are also the measures of area, capacity, and weight, which are by a further process built upon the metre. But decimal notation is equally applicable for the man who finds that it helps his calculations whenever he has to work out his sum in our own old weights and measures; for decimals are really not a system, but, as I said, a process for easily reaching a certain practical result, like logarithms or algebraical symbols. I grant all the advantages which their friends urge in behalf of decimals for the purpose of calculation; but it requires no Act of Parliament to enable those who appreciate them to make their own calculations by way of decimals. Least of all, is legislation needed for the merchant princes—the men of enormous means and gigantic transactions—whose advocate my hon. friend the Member for Liverpool (Mr. Graves) has made himself. They have but to keep a calculating clerk—an employé whose one duty is to manipu-

late the decimals—and they have got what they want. The sufferers will be the little people—the small buyers and sellers, the hucksters and the marketers—who will be compelled, under the penalties of a compulsory Act of Parliament, to learn and to use a system which is, in its outward type, as non-natural as it is novel. I will, in order to prove my point, take the most familiar instance, and show that although a great deal has been said about the advantages of the French subdivisions, yet, after all, our subdivisions are more natural for the ordinary purposes of life. If a boy has to divide an apple, does he ever think anything about the circumference of the earth and its aliquot parts, or about the decimal system and its unrivalled facilities for calculation? No, but he takes his apple, and cuts it into two parts if he wants to halve it, and those halves into quarters if he wants to make four parts of it. In the same way, if a housewife has to cut up the loaf for her family, she divides it into two, into four, into eight, or into sixteen parts, and the sixteen people share their bread naturally. Supposing the loaf to weigh originally a pound, each of these sixteen divisions comes out an ounce. Such is the *rationale* of our system of measuring—the binary system so-called—founded on continual halving, and proved, by the common sense of mankind, before the great era of enlightenment inaugurated in 1789, to be the most convenient and natural one. But I may be told—Halve away, but then express your halvings in decimals. This is very easy for the merchant prince to do when he is totting up his

large transactions in "centals," or for the Chancellor of the Exchequer when dealing with a nation's finances ; but how will it suit the little transactions of daily life ? I come back to my loaf. How are ordinary people to represent halves and quarters by decimal points ? The symbol of a half is the figure "five," with a dot to its left hand ; the symbol of half that quantity, *i.e.* of a quarter, is the sum twenty-five, also with a dot to its left hand. Arithmeticians understand how this can come about, and the symbols have grown natural in their eyes ; but in what—even the most infinitesimal—degree do they tell their own story to the unlearned ? What palpable relations towards each other can be disentangled out of these most frequently recurring symbols ? What is there in the nature of things to show that the dotted five means a half, and the dotted twenty-five a half of that half, and a quarter of the "1," with no dot on either side, which stands for unity ? Decimal notation is then, after all, as I have been arguing, a process, and not a system. It is a system good for the schools, and good for the bustling counting-house and the large sum, but the poor man would be completely thrown out if he had to employ (under penal legislation, too) decimal points for the purpose of measuring his little purchases by halves and quarters.

With permissive means, such as now exist, the system will come in where it is wanted and be kept out where it is not wanted ; but under a compulsory enactment it will intrude itself everywhere, and show itself in its real colours as nothing less than a public nuisance.



But the more we examine the Bill of the Hon. Member for Dumfries, the more inapplicable do its provisions seem for the purposes of practical life. I have touched upon the principles of the metric system, let me now call the attention of the House to the language in which (after the French model) it is proposed to clothe that system.

The new unit of weight is to be the "gram" or "gramme," which is attained by providing a square vessel, whose capacity is the cube of the hundredth part of a metre ("centimetre" to wit), and then weighing the amount of water which it will hold at a certain temperature. One-tenth part of this gram is to be a decigram, and ten times a gram is to be a dekagram, for the reformers decreed that aliquot parts were to be named after the Latin, and multiples after the Greek numerals. How in the name of common sense can we make poor people understand that, because there are the letters "ci" in the one word it means the tenth of a gram, and that because there are the letters "ka" in the other it means ten grams, or 100 decigrams?

My hon. friends the Member for Dumfries and the Member for Liverpool come to this House representing great commercial transactions; but I stand up for the poor man. Only imagine an honest housewife going into a shop and asking for a decigram of pepper, and a dekagram of tea; imagine, too, the milkmaid selling her fluid by the litre. The Member for Liverpool is a kind-hearted man; is he then prepared, with all the stringent force of a penal statute,



to enact that when one of his youthful constituents may desire to effect a commercial transaction in a manufacture for which one portion of that great borough is famous, he should be bound to go to the shop and tender his "dime" for three decigrams of Everton toffee? Fancy the farmer who has been accustomed ever since he entered on his farm to cultivate the "ten" or the "twelve acre field," having to consult the steward about liming the seventeen *are* field, or be a criminal and a contemner of the laws of his country. Fancy the bumpkin who was prepared to boast that he was within a decimetre of catching the fox as he crept through a gap about a decametre from the white gate.

If the theorists and the men of wealth—men of brains, it may be, but as certainly men of self-assurance—have worked out this system for themselves, there are poor men, who form the majority of mankind, for whom it will never answer, and there are men of brains at least equal who are decidedly opposed to its adoption. Is it not possible that our present system is not only quite as convenient and useful as the metric system, but a little more philosophical also?

Why should a standard founded on the quadrant of the earth's circumference passing through the meridian of Paris be a better one than ours? No doubt it looks very solemn, from the grand nomenclature with which it is propped, but all those odd names for the French weights and measures were adopted at the first heat of the great Revolution, when the pedantic aping

after ancient Greek and Latin terms led to their being applied to everything novel and French—from the scanty proportions of a lady's dress to the most intricate principles of jurisprudence and moral philosophy. Moreover, they have taken root in nations whose vernacular languages are themselves derived from the old classical tongues. May it not, I repeat, be just possible that our unit is as good as that of the French, even upon the most abstract grounds?

I have received from Sir John Herschel a letter which induced me to come prominently forward and propose the rejection of the present Bill, instead of giving the silent vote with which I should otherwise have been contented. It is dated the 6th of April, 1868, and is in the following terms:—

“Pray pardon me for calling your attention to this Bill of Messrs. Ewart and Co., in the hope that you will oppose it—at all events by vote, and perhaps by word. It is most uncalled for and violent, and is supported, I believe, mainly by the chemists among men of science, whose reading and experimental practice bring them frequently into contact with the French weights and measures, and such engineers as have foreign contracts to execute. As respects a reference of our fundamental units to a natural standard, our national system is anything but the haphazard, indefensible thing it is usually represented to be. The polar axis of the earth is a much better natural unit than the quadrant of a meridian through Paris, and, dividing this into 500 million inches, our actual imperial foot comes within a 1000th part of 12 such inches, or a

geometrical foot. I have by me two foot-rules—one by a good optician, the other purchased at a good shop, and none the worse for wear, which differ from each other by more than that quantity. Taking for the definition of our ounce the weight in air of 1-1000th part of such a geometrical cubic foot of distilled water at 62° Fahrenheit (our standard temperature), according to the rate declared in the Act 5th of George IV., our actual imperial ounce differs from such a geometrical ounce by only 1-7000th part. But if, as some later experiments seem to have shown, that rate is slightly incorrect, then according to these experiments (that is, according to the best of our actual knowledge) the weight of that bulk of water *in vacuo* at a temperature of 72° in place of 62° is, with absolute precision, identical with our actual imperial ounce also weighed *in vacuo*. As for our measures of capacity, our half-pint is the measure of 10 ounces of water. Were it worth while to legislate for the correction of such trifling deviations, our system would stand on a footing every way more scientific, as concerns its units, than the French (to say nothing of the actual deviations of the latter from its own theoretical basis, which are by no means insignificant). As to the expediency of sweeping away our national system, and the probability that our shopkeepers will ever be got by such dragooning to buy and sell by the metre, litre, and kilogramme, or our farmers and landowners to measure their land by the hectare, and alter the title-deeds of their estates in accordance, &c., these are



matters of statesmanship of which you are a much better judge than I profess to be. For my own part I do not believe it, but the attempt would create the most extreme disgust and resistance."

I may parenthetically notice the astuteness with which the promoters of the change have kept in the background the portion of their scheme which refers to the alteration in the measure of area. The inconveniences hinted at by Sir John Herschel give reason enough for their prudent reticence.

I shall now quote the opinion of another man of science, who, as it will be seen, approaches the question in a direction different from that by which Sir John Herschel travels to it. Professor De Morgan, who, as he himself says, is not only Professor of Mathematics at University College, but practises as an actuary, was one of the witnesses examined before the Committee of 1862, and came under the intellectual thumbscrew of the Chairman, the Hon. Member for Dumfries. Being pressed (Q. 2331) upon the "metrical units," he answered:—

"With regard to the metrical system, I should distinguish between two distinct things. Decimalisation and metricalisation are two things which are often confounded; persons imagine that they must go together, which is not the case. Any system may be made decimal. I am as much for decimal division as any person can be; I believe that the decimal division of units might be introduced very easily, and I believe that it would co-exist perfectly well with the binary division, which I am satisfied must always be used

by the common people, so far as halves and quarters are concerned. The halves and quarters are easily converted into decimal fractions; the decimal system, therefore, if fully established throughout the country, might go on and thrive, consistently with the habit of dividing all units into halves and quarters in common life.

“ 2332. Then you draw a distinction between the decimal system and the metrical system?—The metrical system is the decimal system with the units of the French system superadded. I object to the introduction of the French units into this country. I object to it upon a balance of convenience and inconvenience. I admit that the change might be convenient to our foreign commerce, but I believe that it would create such an immense amount of confusion throughout the country that the inconvenience would far more than counterbalance the advantage we should derive in our foreign commercial relations.”

After submitting to a good deal of pressing about the experience of foreign countries, Professor De Morgan roundly stated (Ans. 2338):—

“ What I mean is, that there would be no advantage commensurate with the disadvantage. The advantage is in foreign commerce, and the disadvantage would be in the internal transactions of the country.”

This led to the point-blank question (2339) “ What are they?” and I particularly direct the attention of the House to the answer:—

“ In the first place, change is in itself a disadvantage, and a great change is a great disadvantage. I



must first have it distinctly proved to me that there are advantages which would more than counterbalance the disadvantages I foresee in other respects. I take an objection to the metre. It arose from a mere fanciful connection with the quarter of the meridian, which I think of no practical importance to any man alive. You might just as well try to subdivide the distance from the earth to the moon. The metre is, of course, too long to be the common measure; it is a little longer than a yard. In decimal division the next thing would be the decimetre, which would be too short to take the place of our foot. The same thing applies very much to the other measures. I not only have a general objection to their size as compared with ours, but I think it would be necessary that a very strong case should be made out in their favour before any such change is effected."

The House will observe that Professor De Morgan approaches the consideration of the desirability of the unit having a direct commensurable relation to the great mundane dimensions in a different spirit from Sir John Herschel. The latter accepts the theoretical desirability of the relation, and then shows that our unit fulfils the law more perfectly than the French. Professor De Morgan assumes the practical attitude of a man of the world, and makes light of the necessity. But wide apart as these two men of science are in their premisses, they meet in their practical conclusion, and equally condemn the penal enactment in our realm of the metrical system. I will only trouble the House with one more quotation from Professor De

Morgan's evidence, as throwing a light upon the frame of mind in which the theorists of France took up the innovation.

“ 2408. The metre, you think, is fanciful?—It was obtained in a fanciful way. It was the ten millionth part of the quarter of the meridian.

“ 2409. Why do you consider that fanciful?—Because it was of no use to anybody, and among the reasons why it was adopted were such as this: that it would be a very pleasant thing for a small proprietor to say, ‘I am lord of exactly such a fraction of the whole surface of the earth.’ Now, I do not suppose that any little proprietor ever troubled his head with the fraction he held since the time when Adam began to delve the land.”

The next witness whom I shall summon is one whom I heard with exceeding astonishment brought forward by the Hon. Member for Liverpool as an advocate for the decimal system, namely, the Astronomer Royal, Mr. Airy, who also appeared before the Committee.

“ Q. 1950 (*Chairman*). What do you consider the conveniences or the inconveniences of the existing scales to be?—I do not think there is much inconvenience.” . . . . (He then describes the gradual growth of different standards.) “This has given rise to apparent anomalies in the form of the existing scale, but these do not, I believe, produce much inconvenience in practice.”

Mr. Airy next explains the comparative ease of the change of weights and measures in France, from the

antecedent separation of provinces under which there was no one system for the whole kingdom, from the confusion of the Revolution, and from the meddling with the details of education on the part of the Government, which enabled it to force its will upon the people in a way which would create tumult in our own free land.\*

“Q. 1964 (*Chairman*). Do you not think that, as the trade of this country continues to increase, it would be of great advantage to the nations to meet together as it were under a common principle and a common system of weights and measures?—I do not think the advantage is worth mentioning in comparison with the extreme difficulty of introducing it; the number of persons is so small, and the daily transactions in foreign trade are very small in comparison with our domestic transactions.

“Q. 1965. Do you not think that these transactions must increase?—I suppose they must, but whether they increase faster than our domestic transactions I am not in a position to state. I think our domestic trade is far more active than it used to be.

“Q. 1966. Would our domestic trade be seriously inconvenienced by the introduction of the decimal system?—By the act of introducing it, it would. I am not remarking on the merits of the decimal system, but the trouble of the change would be inconceivably greater.

“Q. 1967. But if the change could be made *per*

\* And yet, as Mr. Hubbard showed in his speech, and as I have since gathered from other instances, the common people of France have not yet been crushed into the disuse of the old familiar weights and measures.

*saltum*, and you could be transferred from your present state into the decimal system, do you not think the change would be advantageous?—No.”

I beg to direct my hon. friend the Member for Liverpool's particular attention to this brief and decisive answer. It pretty conclusively disposes of Mr. Airy's advocacy of the decimal system.

“Q. 1968. Then do you think that the present system is a perfect system?—If I had a new nation to create, with a new system of weights and measures, I would give them the binary scale throughout. That, I conceive, would be nearest perfection; the binary scale, with means to enable us to use decimal multiples or submultiples.” This scale is further characterized in the next answer as “the subdivision that has been adopted by the consent of mankind, and is undoubtedly the most convenient for the purpose.”

In answer 1970, Mr. Airy says the decimal would “scarcely at all” be the means of facilitating calculations in this country. “In coinage it would; but scarcely in anything else.” In 1979, those who want the decimal system “introduce it themselves without any difficulty,” while “as a practical test, the inch is divided in almost every scale into eighths and tenths; but there are very few working men who ever use the tenth. They use the half, the quarter, the eighth, and even go down to the sixteenth, and they call the next after that the half of the sixteenth.” In answer 1980, Mr. Airy does “not think it of the least consequence that there should be a corresponding and uniform system between different countries.”



The House will allow me briefly to recapitulate my evidence as far as it has yet gone in reference to the compulsory application both of metricalisation and decimalisation. Sir John Herschel has proved that our scale is more philosophical in its unit than the metrical one. The Astronomer Royal has shown that the binary system of division, which is ours, is the "nearest perfection." Professor De Morgan has exposed the pedantic absurdity which lay at the bottom of the revolutionary change in France.

But I have yet another witness to call, a gentleman for whom I hope the Hon. Member for Dumfries will feel some respect, a teacher at whose feet he may not be ashamed to learn wisdom. It is the Chairman himself of the Committee of 1862, Mr. William Ewart, whose sagacious views I desire to offer for the consideration of the Member for Dumfries. The first witness called before that Committee as a leading advocate for the metrical system was Professor Leone Levi, and among the questions which the Chairman put to him I find the following:—

"Do you not think it was an act of indiscretion on the part of the French Legislature to introduce Greek and Latin terms?"

"People utterly ignorant of Greek and Latin must have found great difficulty in understanding the terms used?"

"Is there not this objection also to the use of Greek and Latin terms, that all nations appear, for the sake of brevity, to have adopted very short terms for their weights and measures? In England, for instance, we



adopt the ounce, pound, ell, yard, and so on, almost all of the words being monosyllables; then in France, the *toise*, the *aune*, &c., almost all of which are monosyllables. Is it not, in your judgment, more consistent with experience to follow that common usage of mankind, rather than the more elaborate system of Greek and Latin terms?"—[Questions 74, 75, 76.]

I will not trouble the House with Mr. Levi's replies at length, as I think the questions themselves amount to a condemnation of the proposed system. The witness sums up:—"If you have two difficulties to encounter, one to introduce a new system, and another to learn a new language, the difficulty of introducing it" (the system) "is immensely increased." Only let me entreat my hon. friend not to be too proud to own himself wrong now, and return to a better mind. Mr. Airy has not been above doing so on this very question, for I find that he printed, in 1862, "Notes for the Committee on Weights and Measures," referred to in his evidence, in which these paragraphs occurred:—

"I once recommended the substitution of a measure of 2000 yards instead of the mile of 1760 yards; not only because it is decimal, but also because it approaches very near to one minute of a degree on the earth's surface, because it corresponds to the nautical mile, and because the Government possess the power (through the turnpike roads and the railways) of exhibiting the material symbols of the measure. But the inconvenience arising from the circumstance that 2000 yards cannot be measured by the ordinary land chain of 22 yards would be so great, that I now doubt

the expediency of such a course. I also once recommended the substitution of a weight of 100 lbs. instead of 112 lbs. ; and I think that in certain cases (as at the Custom House, where the duty on large weights of tea, &c., is charged not by the cwt. but by the lb.) it might be convenient. But, viewing the small connection which really exists between the use of the cwt. and the use of the lb., I now doubt the expediency of that substitution."

Such is the Bill which we are asked to pass. Its merits, such as they are, are compressed into the small compass of the facility of decimal notation for a certain class of sums, and the convenience of a common scale by which English and foreign merchants can compare their invoices, and chemists can conduct their experiments. All these advantages already lie within the compass of an easy option ; and those who clamour most loudly for the change, are those most easily able to purchase the convenience for themselves. Its disadvantages I have recapitulated. If the Bill is to become not only an Act, but an Act which shall be in deed, and not in name only, law—an Act which shall not be a mockery and an incubus to the statute-book—it must be weighted with heavy penalties, inexorably inflicted. Last year several of the English papers expressed deserved sympathy for an unlucky Belgian editor, who, in describing a great flood, innocently remarked that the river rose a certain number of toises. For this the unhappy man was dragged to the bar of justice as a criminal ; he had violated the law of his land ; he had brought the Belgian statute-

book into contempt ; he had rebelled against authority ; and so his doom was fine and imprisonment.

This is what we shall have to come to in England, if the Members for Dumfries and Liverpool and Stockport are to make their law and use their law. I have read the language in which the mover of the Bill exposes the inconveniences of his own proposal. I have also brought to the bar of the House men of the highest scientific eminence—Herschel and Airy and De Morgan—as witnesses against the Bill ; but in asking the House to reject it, I do not rely upon their testimony. I speak in the name of the poor honest people of the country, traders and buyers, who will suffer infinite inconvenience and embarrassment, and who in their perplexity will have their small incomes cruelly mulcted, if this extraordinary measure becomes the law of the land. I move that the Bill be read a second time this day six months.

THE END.











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